Dhruv Arora
Computer Science & Engineering
Indian Institute of Technology Bombay

190050034
UG Second Year
Male
DOB: 22/10/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	9.89
Intermediate/+2	CBSE	Shri Agrasen Vidyalaya, Indore	2019	98.00
Matriculation	CBSE	Choithram School North Campus, Indore	2017	10.00

Pursuing a Minor Degree in **Mathematics**

Scholastic Achievements

- Received **Institute Academic Prize** (top **25** among 1100) for exceptional academic performance *(2020)*
- Awarded **AP grades** (top 1%) in *Calculus, Organic Chemistry, Inorganic Chemistry* and was the **only student among 1100** to secure an **AP grade** in *Basics of Electricty and Magnetism* *(2020)*
- Secured **All India Rank 24** in *IIT-JEE (Advanced)* 2019 among 240 thousand eligible candidates *(2019)*
- Secured **All India Rank 3** in *IIT-JEE (Main)* 2019 among 1.4 million eligible candidates *(2019)*
- Achieved **All India Rank 37** in *KVPY (Kishore Vaigyanik Protsahan Yojna)* 2018 and **All India Rank 30** in *KVPY* 2017 and was awarded a fellowship for the same *(2017-18)*
- Recipient of the **NTSE (National Talent Search Examination)** scholarship awarded by NCERT *(2017)*

Olympiads

- **Represented India** in **IPhO (International Physics Olympiad)** 2019 in Tel Aviv, Israel wherein secured **35th** position among 500 international candidates and was awarded a **silver medal** *(2019)*
- **Represented India** in **APhO (Asian Physics Olympiad)** 2019 in Adelaide, Australia wherein secured **16th** position among 300 international candidates and was awarded a **silver medal** *(2019)*
- Among the **top 50** nationwide to clear cutoff score for **Indian National Chemistry Olympiad** *(2019)*
- Among the **top 60** to be awarded **merit certificate** for **Indian National Mathematics Olympiad** *(2018)*
- Among the **top 300** selected for participating in the **Indian National Astronomy Olympiad** *(2019)*
- Secured **maximum marks** among **46,000** candidates appearing for **NSEP** 2018-19 *(2018)*
- Among the **top 300** selected for appearing in the **Indian National Junior Science Olympiad** *(2015)*

Key Projects

Cryptography and Cryptanalysis *(Apr 2020 - Jun 2020)*
Summer of Science *Maths and Physics Club, IIT Bombay*

- Explored **cryptographic schemes** like shift ciphers, monoalphabetic substitution cipher, Vigénere cipher and **cryptanalysis methods** including index of coincidence method and Kasiki analysis
- Analysed notions of **perfect secrecy**, **Shannon's theorem** and **asymtotic secrecy** in multiple settings
- Overviewed constructs including *SPNs, Fiestel networks, DES, AES* and *Merkel Damgård Transform*
- Analysed hardness assumptions including **factorisation, RSA** and **Diffie Hellman assumption**
- Overviewed working of message authentication codes like **CBC-MAC** and **HMAC**
- Overwiewed **Diffie Hellman key exhange**, chain based and tree based digital signatures

Online Competetion and Development Environment *(Sep 2020 - Present)*
Prof. Amitabha Sanyal, IITB | Course Project *IIT Bombay*

- Implementing a **cloud** based IDE and programming contest platform supporting multiple languages
- Setting up a website supporting **Secured User Authentication** system using the **Django** framework
- Exploring the use of **WebAssembly** for in-browser compiling utility of source codes
- Including a **Development mode** supporting GitHub sync, debugging and autofill utilities
- Working on a **sandbox environment** on the server to improve robustness of individual workspaces

Morphisms *(Sep 2020)*
Prof. Ajit A. Diwan, IITB | Course Project *IIT Bombay*

- Used **binary exponentiation on matrices** to calculate length of a morphism in logarithmic time
- Implemented a polylogarithmic time algorithm to find the i^{th} element in limit of a morphism

Abstract Data Type - Permutation *(Aug 2020)*
Prof. Ajit A. Diwan, IITB | Course Project *IIT Bombay*

- Implemented an **efficient class** to operate on permutation abstract data type in C++
- Treating permutations as **bijective maps** and **collection of disjoint directed cycles**, implemented operations including *inversion, product, exponentiation, and square root* in **linear time**
- Used **Extended Euclidean Algorithm** along with **Extension of Chinese Remainder Theorem** to implement *logarithms* for permutations in linear time by **automated congruence solving**

Minor Projects

Course Organiser and Analyser *(Sep 2020)*
Prof Amitabha Sanyal, IITB | Course Project *IIT Bombay*

- Implemented an analyser accepting CSV inputs using **sed and awk scripts** for use in UNIX terminals
- Added support for setting **custom color themes** and querying entries by multiple fields

Rolling Ball GIF *(May 2020)*
Prof. Rushikesh K. Joshi, IITB | Course Project *IIT Bombay*

- Used **Fast Light Toolkit** in C++ to create **animation** for a rigid ball rolling inside a tube

Slide Puzzle Board *(Jan 2020)*
Prof. Rushikesh K. Joshi, IITB | Course Project *IIT Bombay*

- Implemented a 15 block slide puzzle using **object oriented programming** in **C++**
- Used **Fast Light Toolkit** for graphics and **fast inversion checking** for board creation

Courses Undertaken

Computer Science	Abstractions and Paradigms in Programming including Lab, Software Systems Lab*, Data Structures and Algorithms including Lab*, Data Analysis and Interpretation*, Discrete Structures*, Computer Programming and Utilization, Computer Networks including Lab**, Logic for Computer Science**, Design and Analysis of Algorithms**, Digital Logic Design including Lab**, Foundations of Machine Learning**
Mathematics	Calculus, Linear Algebra, Real Analysis*
Other Courses	Engineering Graphics and Drawings, Introduction to Electrical and Electronics Circuits*, Physical Chemistry, Quantum Physics and its applications

** to be completed by November 2020* *** to be completed by April 2021*

Technical Skills

Programming Languages	C++, Python, Java, Bash, Sed, Awk
Web Development	HTML, CSS, JavaScript, Bootstrap, PHP, AngularJS
Data Science	MATLAB, GNUOctave, NumPy, Pandas, SciPy
Softwares	Android, LaTeX, Doxygen, Git, Make, AutoCAD, SolidWorks, Vim, Docker

Positions of Responsibility

Organiser - Creatives *(Dec 2019)*
Mood Indigo, IIT Bombay

- Responsible for smooth conduction of events in **Mood Indigo**, Asia's largest cultural festival
- Aided in ground work for recording and photography for multiple events and competitions

Organiser - Infrastructure *(Jan 2020)*
Techfest, IIT Bombay

- Responsible for smooth conduction of events in **Techfest**, Asia's largest technical festival
- Aided in ground work for infrastructural management for multiple events and competitions

Extracurricular

- Dedicated **80 hours** to **social service** creating educational content under Tarang - NSS, IIT Bombay *(2020)*
- Participated in basketball and football competitions organised by CSEA, IIT Bombay *(2020)*
- Successfully completed a coursera course in **Introductory Psychology** *(2020)*
- Engineered a **bluetooth controlled bot** in XLR8, organised by ERC, IIT Bombay *(2019)*
- Engineered an **Remote Controlled plane** for competition organised by Aeromodelling Club *(2019)*
- **Directed** and shot a short film which stood 1^{st} in Freshiezza organised by Silverscreen, IIT Bombay *(2019)*
- Part of Click Beatles, a community of enthusiastic photographers in IIT Bombay *(2019-Present)*